

WHAT IS CLAIMED IS :

1. A bidirectional optical add-drop multiplexer for WDM (wavelength division multiplexing) optical signals being transmitted in directions opposite to each other through different WDM channels of one optical transmission line in an optical WDM
- 5 bidirectional ring network, said multiplexer comprising:

first and second optical circulators each having four ports, and among the ports, respective first ports for input of an optical signal having a wavelength to be added;

a first WDD (wavelength division demultiplexer) which drops an optical signal having a specific wavelength by demultiplexing optical WDM signals transmitted

10 through a first portion of said one optical transmission line, outputs to a third port of the first optical circulator optical signals not being dropped, and transmits to said first portion optical signals from a second portion of said optical transmission line inputted from the third port of the first optical circulator;

a first optical wavelength selector which is connected between a fourth port of

15 the first optical circulator and a second port of the second optical circulator, reflects an optical signal that is to be added among optical signals inputted from the third port of the first optical circulator, and passes optical signals not being added;

a second WDD which drops an optical signal having a specific wavelength by demultiplexing optical WDM signals transmitted through said second portion, outputs

20 to a third port of the second optical circulator optical signals not being dropped, and transmits to said second portion optical signals inputted from the third port of the second optical circulator; and

a second optical wavelength selector which is connected between a second port of the first optical circulator and a fourth port of the second optical circulator, reflects an

optical signal having a wavelength that is to be added among the optical signals inputted from the third port of the second optical circulator, and passes optical signals not being added.

5 2. A bidirectional optical add-drop multiplexer as claimed in claim 1, wherein the wavelength of said optical signal that is to be added among optical signals inputted from the third port of the first optical circulator differs from said specific wavelength of the optical signal dropped by the first WDD.

10 3. A bidirectional optical add-drop multiplexer as claimed in claim 1, wherein said specific wavelength of the optical signal dropped by the first WDD is the same as said specific wavelength of the optical signal dropped by the second WDD.

 4. A bidirectional optical add-drop multiplexer as claimed in claim 1, wherein,
15 for each of the circulators, the ports are circularly sequential so that an optical signal inputted through one of the ports is outputted through a next one of the ports.

 5. A bidirectional optical add-drop multiplexer as claimed in claim 1, wherein said wavelength that is to be added among the optical signals inputted from the third
20 port of the second optical circulator differs from said specific wavelength dropped by the second WDD.

6. A bidirectional optical add-drop multiplexer as claimed in claim 5, wherein said wavelength that is to be added among the optical signals inputted from the third port of the second optical circulator is the same as said wavelength that is to be added among the optical signals inputted from the third port of the first optical circulator.

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7. A bidirectional optical add-drop multiplexer as claimed in claim 1, wherein the number of optical signals dropped upon demultiplexing by the first WDD is equal to the number of wavelengths dropped upon said demultiplexing by the second WDD.

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8. A bidirectional optical add-drop multiplexer as claimed in claim 7, wherein the number of optical signals reflected by each of the first and second optical wavelength selectors is equal to the number of wavelengths added by said each of the first and second optical wavelength selectors.

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9. A bidirectional optical add-drop multiplexer as claimed in claim 1, wherein the number of optical signals reflected by each of the first and second optical wavelength selectors is equal to the number of wavelengths added by said each of the first and second optical wavelength selectors.

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10. A bidirectional optical add-drop multiplexer for wave division multiplexing (WDM) optical signals being transmitted in directions opposite to each other through different WDM channels of one optical transmission line in an optical WDM bidirectional ring network, said multiplexer comprising:

5 first and second optical circulators each having four ports, and among the ports, respective first ports for input of an optical signal having a wavelength to be added;

first WDDs (wavelength division multiplexers), connected in tandem on a first portion of said one optical transmission line, which drop optical signals having specific respective wavelengths, output to a third port of the first optical circulator optical
10 signals not being dropped, and transmit to said first portion optical signals inputted from the third port of the first optical circulator;

first optical wavelength selectors which are connected between a fourth port of the first optical circulator and a second port of the second optical circulator, reflect one by one in order optical signals that are to be added among optical signals inputted from
15 the third port of the first optical circulator, and pass optical signals not being added;

second WDDs, connected in tandem on a second portion of said optical transmission line, which drop optical signals having specific respective wavelengths, output to a third port of the second optical circulator optical signals not being dropped, and transmit to a second portion of said optical transmission line optical signals inputted
20 from the third port of the second optical circulator; and

second optical wavelength selectors which are connected between a second port of the first optical circulator and a fourth port of the second optical circulator, reflect optical signals having respective wavelengths that are to be added among the optical signals inputted from the third port of the second optical circulator, and pass

optical signals not being added.

11. A bidirectional optical add-drop multiplexer as claimed in claim 10,
wherein wavelengths of optical signals that are to be added among optical signals
5 inputted from the third port of the first optical circulator differ from said specific
respective wavelengths of optical signals dropped by the first WDDs.

12. A bidirectional optical add-drop multiplexer as claimed in claim 10,
wherein said specific respective wavelengths of optical signals dropped by the first
10 WDDs are the same as said specific respective wavelengths of optical signals dropped
by the second WDDs.

13. A bidirectional optical add-drop multiplexer as claimed in claim 10,
wherein, for each of the circulators, the ports are circularly sequential so that an optical
15 signal inputted through one of the ports is outputted through a next one of the ports.

14. A bidirectional optical add-drop multiplexer as claimed in claim 10,
wherein said respective wavelengths that are to be added among the optical signals
inputted from the third port of the second optical circulator differ from said specific
20 respective wavelengths dropped by the second WDDs.

15. A bidirectional optical add-drop multiplexer as claimed in claim 14,
wherein said respective wavelengths that are to be added among the optical signals
inputted from the third port of the second optical circulator are the same as said
respective wavelengths that are to be added among the optical signals inputted from the
5 third port of the first optical circulator.

16. A bidirectional optical add-drop multiplexer as claimed in claim 10,
wherein the number of optical signals dropped upon demultiplexing by the first WDDs
is equal to the number of wavelengths dropped upon said demultiplexing by the second
10 WDDs.

17. A bidirectional optical add-drop multiplexer as claimed in claim 16,
wherein the number of optical signals reflected by each of the first and second optical
wavelength selectors is equal to the number of wavelengths added by said each of the
15 first and second optical wavelength selectors.

18. A bidirectional optical add-drop multiplexer as claimed in claim 10,
wherein the number of optical signals reflected by each of the first and second optical
wavelength selectors is equal to the number of wavelengths added by said each of the
20 first and second optical wavelength selectors.

19. A bidirectional optical add-drop multiplexer for WDM (wavelength division multiplexing) optical signals being transmitted in directions opposite to each other through different WDM channels of one optical transmission line in an optical WDM bidirectional ring network, said multiplexer comprising:

5 first and second optical circulators each having four ports, and among the ports, respective first ports for input of an optical signal having a wavelength to be added;

a first WDD (wavelength division demultiplexer) which drops optical signals having specific respective wavelengths by demultiplexing the optical WDM signals transmitted through a first portion of said one optical transmission line, outputs to a
10 third port of the first optical circulator optical signals not being dropped, and transmits to said first portion optical signals inputted from the third port of the first optical circulator;

first optical wavelength selectors which are connected between a fourth port of
15 the first optical circulator and a second port of the second optical circulator, reflect one by one in order optical signals that are to be added among optical signals inputted from the third port of the first optical circulator, and passes optical signals not being added;

a second WDD which drops optical signals having specific respective wavelengths by demultiplexing optical signals transmitted through a second portion of
20 said optical transmission line, outputs to a third port of the second optical circulator optical signals not being dropped, and transmits to said second portion optical signals inputted from the third port of the second optical circulator; and

second optical wavelength selectors which are connected between a second port of the first optical circulator and a fourth port of the second optical circulator,

reflect one by one in order optical signals having specific respective wavelengths that are to be added among the optical signals inputted from the third port of the second optical circulator, and pass optical signals not being added.

5 20. A bidirectional optical add-drop multiplexer as claimed in claim 19, wherein wavelengths of optical signals that are to be added among optical signals inputted from the third port of the first optical circulator differ from said specific respective wavelengths of optical signals dropped by the first WDD.

10 21. A bidirectional optical add-drop multiplexer as claimed in claim 19, wherein said specific respective wavelengths of optical signals dropped by the first WDD are the same as said specific respective wavelengths of optical signals dropped by the second WDD.

15 22. A bidirectional optical add-drop multiplexer as claimed in claim 19, wherein said respective wavelengths that are to be added among the optical signals inputted from the third port of the second optical circulator differ from said specific respective wavelengths dropped by the second WDD.

20 23. A bidirectional optical add-drop multiplexer as claimed in claim 22, wherein said respective wavelengths that are to be added among the optical signals inputted from the third port of the second optical circulator are the same as said respective wavelengths that are to be added among the optical signals inputted from the third port of the first optical circulator.

24. A bidirectional optical add-drop multiplexer as claimed in claim 19, wherein the number of optical signals dropped upon demultiplexing by the first WDD is equal to the number of wavelengths dropped upon said demultiplexing by the second WDD.

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25. A bidirectional optical add-drop multiplexer as claimed in claim 24, wherein the number of optical signals reflected by each of the first and second optical wavelength selectors is equal to the number of wavelengths added by said each of the first and second optical wavelength selectors.

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26. A bidirectional optical add-drop multiplexer as claimed in claim 19, wherein the number of optical signals reflected by each of the first and second optical wavelength selectors is equal to the number of wavelengths added by said each of the first and second optical wavelength selectors.